Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-16. (Canceled)

17. (currently amended) A method of laying out a node-link structure in a space with negative curvature; the method comprising:

obtaining nearby relationship data for a subject element in the structure, the nearby relationship data indicating information about nearby node-link relationships, the nearby relationship data excluding relationships with at least one element of the node-link structure; and

~~based on only the nearby relationship data, and not on the position of any other element in the structure,~~ obtaining layout data identifying the subject element's position in the space with negative curvature, based on only the nearby relationship data and not on layout data identifying the position of any other element in the space with negative curvature.

18. (original) A method as in claim 17 in which the space with negative curvature is a hyperbolic plane.

19. (previously presented) A method as in claim 17 wherein the subject element has a parent element in the node-link structure, and in which the subject element and the parent are nodes and in which the layout data include position displacement data indicating a distance between the parent's position and the subject element's position and angle displacement data indicating an angular difference between an incoming link to the parent and an outgoing link

from the parent to the subject element.

20. (original) A method as in claim 19 in which the layout data include only the position displacement data and the angle displacement data.

21. (previously presented) A method as in claim 17 wherein the subject element has a parent element in the node-link structure, and in which the act of obtaining the nearby relationship data comprises:

for each of a set of children of the parent, obtaining a count of grandchildren; the subject element being one of the set of children.

22. (original) A method as in claim 21 in which the act of obtaining layout data comprising:

using the counts of grandchildren to obtain, for each of the set of children, a radius and an angle; and

using the radii and angles for the set of children to obtain a position displacement and an angle displacement between the parent and the subject element.

23. (original) A method as in claim 22 in which the subject element has a previous angle displacement; the method further comprising comparing the obtained angle displacement with the previous angle displacement to determine whether to lay out children of the subject element.

24. (previously presented) A method as in claim 17 wherein the subject element has a parent element in the node-link structure, and in which the nearby node-link relationships include only relationships among the parent and the parent's children and grandchildren.

25. (original) A method according to claim 17, wherein said step of obtaining layout data

comprises the step of calculating said layout data.

26. (currently amended) A system comprising:

a processor for laying out a node-link structure in a space with negative curvature; the processor, in laying out the node-link structure:

obtaining nearby relationship data for a subject element in the structure, the nearby relationship data indicating information about nearby node-link relationships, the nearby relationship data excluding relationships with at least one element of the node-link structure; and

~~based on only the nearby relationship data, and not on the position of any other element in the structure,~~ obtaining layout data identifying the subject element's position in the space with negative curvature, based on only the nearby relationship data and not on layout data identifying the position of any other element in the space with negative curvature.

27. (currently amended) An article of manufacture for use in a system that includes: a storage medium access device; and

a processor connected for receiving data accessed on a storage medium by the storage medium access device; the article of manufacture comprising:

a storage medium; and

instruction data stored by the storage medium; the instruction data indicating instructions the processor can execute; the processor, in executing the instructions, laying out a node-link structure in a space with negative curvature; the processor, in laying out the node-link structure:

obtaining nearby relationship data for a subject element in the structure, the nearby relationship data indicating information about nearby node-link relationships, the nearby

relationship data excluding relationships with at least one element of the node-link structure; and

~~based on only the nearby relationship data, and not on the position of any other element in the structure,~~ obtaining layout data identifying the subject element's position in the space with negative curvature, based on only the nearby relationship data and not on layout data identifying the position of any other element in the space with negative curvature.

28. (currently amended) A method of transferring data between first and second machines over a network, the second machine including memory and a processor connected for accessing the memory; the memory being for storing instruction data; the method comprising:

establishing a connection between the first and second machines over the network; and

operating the first and second machines to transfer instruction data from the first machine to the memory of the second machine; the instruction data indicating instructions the processor can execute; the processor, in executing the instructions, laying out a node-link structure in a space with negative curvature; the processor, in laying out the node-link structure:

obtaining nearby relationship data for a subject element in the structure, the nearby relationship data indicating information about nearby node-link relationships, the nearby relationship data excluding relationships with at least one element of the node-link structure; and

~~based on only the nearby relationship data, and not on the position of any other element in the structure,~~ obtaining layout data identifying the subject element's position in the space with negative curvature, based on only the nearby relationship data and not on layout data identifying the position of any other element in the space with negative curvature.

29. (previously presented) A method of laying out a plurality of elements of a node-link

structure in a space with negative curvature, the method comprising:

obtaining nearby relationship data for each element in the plurality, the nearby relationship data indicating information about nearby node-link relationships;

based on the nearby relationship data for each element in the plurality, calculating element's position in the space with negative curvature; and

storing the positions for each element in the plurality in a data structure such that after the positions for all elements in the plurality have been calculated, the position of each element in the plurality is stored in the data structure only relative to an element of the node-link structure other than a root element of the node-link structure.

30. (previously presented) A method according to claim 29, wherein said step of storing comprises the step of storing the positions for each element in the plurality in a data structure such that after the positions for all elements in the plurality have been calculated, the position of each element in the plurality is stored in the data structure only relative to a parent of the element.

31. (previously presented) A method as in claim 30, in which the elements in the plurality of elements are nodes, and in which the parents are nodes, and in which the position of each particular element in the plurality as represented in the data structure after the positions for all elements in the plurality have been calculated, includes position displacement data indicating a distance between the particular element and a parent of the particular element, and angle displacement data indicating an angular difference between an incoming link to the parent of the particular element and an outgoing link from the parent to the particular element.

32. (previously presented) A method as in claim 31, in which the position of each particular element in the plurality as represented in the data structure after the positions for all elements in the plurality have been calculated, includes only the position displacement data and the angle displacement data.

33. (previously presented) A method as in claim 30, in which the step of obtaining the nearby relationship data comprises, for a particular one of the elements in the plurality:

for each of a set of children of the parent of the particular element, obtaining a count of grandchildren, the particular element being one of the set of children.

34. (previously presented) A method as in claim 33, in which the step of obtaining layout data comprises, for the particular element:

using the counts of grandchildren to obtain, for each of the set of children, a radius and an angle; and

using the radii and angles for the set of children to obtain a position displacement and an angle displacement between the parent and the particular element.

35. (previously presented) A method as in claim 34, in which the particular element has a previous angle displacement, the method further comprising the step of comparing the obtained angle displacement with the previous angle displacement to determine whether to lay out children of the particular element.

36. (previously presented) A method as in claim 30, in which the nearby node-link relationships include only relationships among the parent and the parent's children and grandchildren.

37. (previously presented) A method as in claim 29, in which the method is performed in each of a series of iterations, each iteration comprising the steps of:

identifying elements to be laid out in the iteration;

performing the steps of obtaining and calculating for each of the identified elements; and

performing the step of storing for the identified elements.

38. (previously presented) A method as in claim 37, in which the series of iterations is performed in response to an event requesting an insertion or deletion, the identified elements including elements affected by the insertion or deletion.

39. (previously presented) A method as in claim 38, further comprising, before the series of iterations, the step of obtaining a weight for each iteration,

each iteration comprising using the weight in performing the step of calculating each element's position in the space with negative curvature.

40. (previously presented) A method as in claim 37, in which the identified elements include elements added to the structure during a preceding iteration.

41. (previously presented) A method as in claim 29, in which the space with negative curvature is a hyperbolic plane.

42. (previously presented) A system comprising:

a processor for laying out a plurality of elements of a node-link structure in a space with negative curvature, the processor, in laying out the node-link structure:

obtaining nearby relationship data for each element in the plurality, the nearby relationship data indicating information about nearby node-link relationships;

based on the nearby relationship data for each element in the plurality, calculating element's position in the space with negative curvature; and

storing the positions for each element in the plurality in a data structure such that after the positions for all elements in the plurality have been calculated, the position of each element in the plurality is stored in the data structure only relative to an element of the node-link structure other than a root element of the node-link structure.

43. (previously presented) An article of manufacture for use in a system that includes a storage medium access device and a processor connected for receiving data accessed on a storage medium by the storage medium access device, the article of manufacture comprising:

a storage medium; and

instruction data stored by the storage medium, the instruction data indicating instructions the processor can execute, the processor, in executing the instructions, laying out a plurality of elements of a node-link structure in a space with negative curvature, the processor, in laying out the plurality of elements:

obtaining nearby relationship data for each element in the plurality, the nearby relationship data indicating information about nearby node-link relationships;

based on the nearby relationship data for each element in the plurality, calculating element's position in the space with negative curvature; and

storing the positions for each element in the plurality in a data structure such that after the positions for all elements in the plurality have been calculated, the position of each element in the plurality is stored in the data structure only relative to an element of the node-link structure other

than a root element of the node-link structure.

44. (previously presented) A method of transferring data between first and second machines over a network, the second machine including memory and a processor connected for accessing the memory, the memory being for storing instruction data, the method comprising the steps of:

establishing a connection between the first and second machines over the network; and

operating the first and second machines to transfer instruction data from the first machine to the memory of the second machine, the instruction data indicating instructions the processor can execute, the processor, in executing the instructions, laying out a plurality of elements of a node-link structure in a space with negative curvature, the processor, in laying out the plurality of elements:

obtaining nearby relationship data for each element in the plurality, the nearby relationship data indicating information about nearby node-link relationships;

based on the nearby relationship data for each element in the plurality, calculating element's position in the space with negative curvature; and

storing the positions for each element in the plurality in a data structure such that after the positions for all elements in the plurality have been calculated, the position of each element in the plurality is stored in the data structure only relative to an element of the node-link structure other than a root element of the node-link structure.